

National
Aeronautics
and
Space
Administration

Ames Research Center

Annual Report

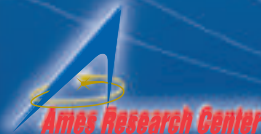
Prepared by

the Office

of the Chief

Financial

Officer





TO OUR STAKEHOLDERS



A handwritten signature in black ink that reads "Henry McDonald".

Dr. Henry McDonald,
Center Director



A handwritten signature in black ink that reads "Lewis S. G. Braxton III".

Lewis S. G. Braxton III,
Chief Financial Officer

As we enter the next millennium, we should pause and consider all that we as a nation have accomplished in the last 100 years. It's startling to think that at the beginning of the 20th Century airplanes were just a dream. In 1999, not only are airplanes a common form of transportation, but rocket launches and space exploration have become facts of everyday life. We at Ames Research Center can look back on all our accomplishments during the last 60 years and state proudly that we have developed many of the technologies that have made these advances possible. As we look forward to the future, Ames is involved in new cutting-edge technologies, such as Information Technology, Nanotechnology, and Biotechnology.

We are pleased to present the 1999 Annual Report of Ames Research Center. This report highlights our activities and accomplishments for the year. Once again, the people of Ames demonstrated their exceptional talent, commitment to excellence, and unrivaled dedication. The report covers the Center's activities from October 1, 1998, through September 30, 1999.

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NASA

AMES

RESEARCH

CENTER

1999

ANNUAL

REPORT

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AMES AT A GLANCE

AMES RESEARCH CENTER: NASA'S CENTER OF EXCELLENCE FOR INFORMATION TECHNOLOGY

NASA's missions in space exploration and aeronautics will require advances in many areas of science and technology, but most critical among these enabling technologies will be that collection of technologies known as Information Technology (IT).



To ensure that NASA fully exploits this most critical enabling technology, Ames Research Center has been designated the NASA Center of Excellence for Information Technology (COE-IT). Because of both its long history of computer science research excellence and its location in the heart of Silicon Valley, Ames Research Center was the logical place for

NASA to focus its IT research program. Ames Research Center has embraced its responsibilities as the NASA COE-IT and accepted the challenge of excellence. During the past two years, the Center of Excellence for Information Technology has led an effort to understand NASA's future IT requirements and the concomitant research investments necessary to meet them.

NASA has identified four IT research cornerstones upon which to build its future: Automated Reasoning for Autonomous Systems, High-Performance Computing and Networking, Human-Centered Computing, and Revolutionary Computing. Research on automated reasoning for autonomous systems will enable a new generation of spacecraft to do more exploration at a much lower cost than traditional approaches. An impressive early example of this technology (Remote Agent Autonomy Architecture) has demonstrated its usefulness on the Deep Space One (DS-1) mission.

NASA has a long history of leadership in high-performance computing for both scientific and engineering applications. Toward this end, NASA is playing an important role in the Next-Generation Internet (NGI) project, which will develop networks that are 100 to 1000 times faster than today's Internet.

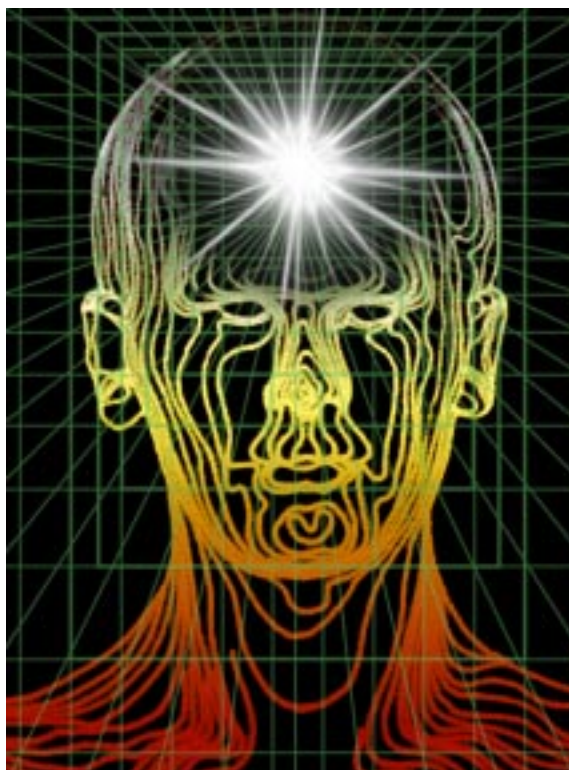
The emerging concept of "human-centered computing" represents a significant shift in thinking about information technology in general, and about intelligent machines in particular. Within this framework, NASA researchers are inventing and deploying sophisticated computational aids designed to amplify human cognitive and perceptual abilities. Revolutionary Computing consists of research and development of technologies, at both the device and system levels, of quantum mechanical computing, biological computing, sensor fusion, associative learning, and sensory-guided motor control. By building on these four research cornerstones, IT will enable a wide range of applications and missions, some of which we can only dimly glimpse today.

Ames Research Center has mission assignments in Astrobiology and Aerospace Operations Systems. Astrobiology is defined in the NASA Strategic Plan as the study of the living universe. Astrobiology studies are multidisciplinary and are directed toward understanding:

- Origin of life—how life began in the context of the formation and diversity of planetary systems.
- Evolution of life—the co-evolution of life and the planetary environment, and the limits of life.
- Distribution of life—the search for other biospheres (past or present) in our solar system and beyond.
- Destiny of life—how life may adapt to our changing environment and to other environments beyond the Earth.

The designation of Ames Research Center as the Agency lead in Astrobiology recognizes Ames Research Center's historical strength in multidisciplinary research in the Life, Space, and Earth sciences, and Ames Research Center's unique involvement in all of NASA's Strategic Enterprises. Subsequently, Ames Research Center was also designated as the lead for Astrobiology by the Space Science, Earth Science, and Human Exploration and Development of Space Enterprise Offices.

Aerospace Operations Systems (AOS) is the mission assigned to Ames Research Center by the Agency in recognition of Ames' history of contributions in flight management, air traffic management automation, and aviation human factors, as well as in the airborne technologies of guidance and control. AOS is defined as those ground, satellite, and aircraft systems and human operators that control the operational safety, efficiency, and capacity of aircraft operating in the airspace and airports. AOS specifically encompasses:



- Communication, navigation, and surveillance (CNS) systems;
- Air traffic management systems, interfaces, and procedures;
- Relevant cockpit systems, interfaces, and procedures;
- Operational human factors, their impact on aerospace operations, and error mitigation;
- Weather and hazardous environment characterization, detection, and avoidance systems.

In addition to Astrobiology and Aerospace Operations Systems, Ames is involved in many other cutting-edge technologies such as: Nanotechnology, Biotechnology, Rotorcraft, and Thermal Protection Systems.

AMES RESEARCH CENTER

CENTER OF EXCELLENCE FOR INFORMATION TECHNOLOGY

Ames is the Center of Excellence for Information Technology. Centers of Excellence are focused, Agency-wide leadership responsibilities in a specific area of technology or knowledge. They must strategically maintain or increase the Agency's preeminent position in the assigned area of excellence in line with the program requirements of the Strategic Enterprises and long-term strategic interests of the Agency. A designation of Center of Excellence brings to the Center the charge to be preeminent within the Agency, if not worldwide, with respect to the human resources, facilities, and other critical capabilities associated with the particular area of excellence.

MISSIONS

Ames Research Center has missions in Astrobiology and Aerospace Operations Systems. Center missions identify the primary concentration of capabilities to support the accomplishment of Strategic Enterprise goals. Each Center has designated areas of mission responsibility, which provide a basis for building human resources capabilities and physical infrastructure in direct support of Enterprise requirements.

LEAD CENTER PROGRAMS

The Ames Research Center Lead Center Responsibilities in support of Agency Programs are:

- *Intelligent Systems (IS)*
- *High-Performance Computing and Communications (HPCC).*

The Ames Research Center Lead Center Responsibilities in support of other Agency Assignments are:

- *Consolidated Supercomputing Management Office (CoSMO)*
- *Information Technology Security (ITS).*

The Ames Research Center Lead Center Responsibilities in support of the Enterprises are:

- *Information Technology R&T Base Program*
- *Rotorcraft R&T Base Program*
- *Aerospace Operations Systems R&T Base Program*
- *Aerospace System Capacity Program*
- *Simulation Facility Group Director*
- *Stratospheric Observatory for Infrared Astronomy (SOFIA) Program*
- *Gravitational Biology and Ecology Program (GB&E).*

Each NASA program is assigned to a Lead Center for implementation. Lead Center Directors have full program management responsibility and authority, and thus, full accountability for assigned missions or programs, ensuring that they are being managed to agreed-on schedule milestones, budget guidelines, technical requirements, and all safety and reliability standards.

CENTER CORE COMPETENCIES

Ames Research Center's assigned roles and responsibilities are based on its core competencies. Founded in the Center's workforce capabilities and physical assets, these competencies are enhanced by a broad range of collaborations with other government agencies, industry, and academia. Ames Research Center has the following core competencies:

- *Information Technology*
- *Biotechnology*
- *Nanotechnology*
- *Aerospace Operations Systems*
- *Rotorcraft*
- *Thermal Protection Systems*

THE NASA VISION

NASA is an investment in America's future. As explorers, pioneers, and innovators, we boldly expand frontiers in air and space to inspire and serve America and to benefit the quality of life on Earth.

THE NASA MISSION

To advance and communicate scientific knowledge and understanding of the Earth, the solar system, and the universe, and use the environment of space and research.

To advance human exploration, use, and development of space.

To research, develop, verify, and transfer advanced aeronautics, space, and related technologies.

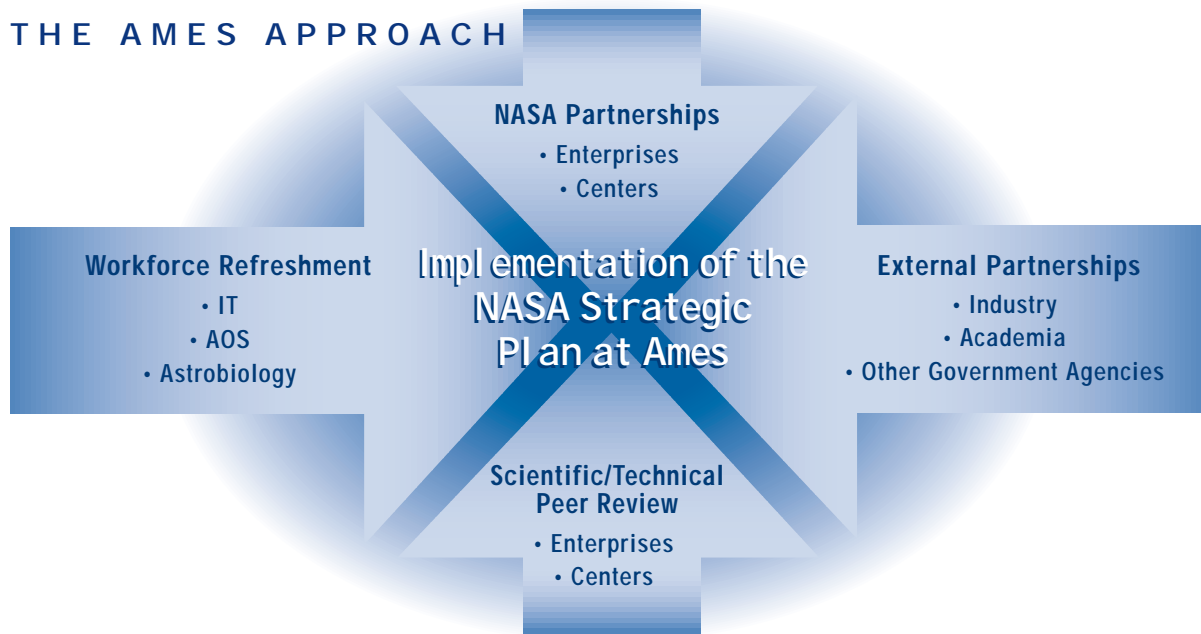
THE AMES MISSIONS

As NASA's Center of Excellence for Information Technology, to lead and coordinate research encompassing the fields of high-performance computing and networking, human-centered computing, and automated reasoning.

As NASA's lead center for Astrobiology, to develop science and technology requirements for current and future flight missions that are relevant to astrobiology, including advanced concepts and technology development; to identify and develop astrobiology mission opportunities, life sciences experiments for spaceflight, and space science research components of astrobiology; to carry out fundamental and applied research in astrobiology and astrobiology-related technologies; and to lead in Information Technology applications and astrobiology education and outreach programs that inform and inspire the American public.

As NASA's lead center for Aerospace Operations Systems, to champion research efforts in air traffic control and human factors; to lead the Agency's research efforts in rotorcraft technology; and to create design and development process tools, and wind tunnel and simulation facilities technologies.

THE AMES APPROACH



THE AMES VALUES

Ames management and supervisors recognize that people are the organization's most important asset. To ensure a safe work environment that accurately reflects that belief, ARC encourages and promotes adherence to the following core values:

Safety

We will ensure a safe and secure working environment for our staff.

Respect

We have respect for the individual and for diversity in culture, background, and experience. We maintain the highest principles of fairness and equitable treatment of all employees.

Communication

We recognize that only through open and honest communication will our goals be achieved.

Teamwork

We believe in cooperative interaction among others and ourselves. By working together with respect, trust, and mutual support, we achieve common goals.

Creativity

We foster creativity, ingenuity, and innovation in our endeavors.

Integrity

We maintain the highest principles of integrity, honesty, and accountability.

Excellence

We continually strive to improve. We demand professionalism in our conduct and excellence in our products.

Customer Focus

We are responsive to our customers and satisfy their requirements.

Responsibility

We are responsive stewards of the public interest, public resources, and the public trust.

Relevance

We ensure that all our endeavors are aligned with national needs and the Agency vision and purpose.

Discovery

We are bold, but prudent, as we expand the boundaries of scientific understanding and technical knowledge in air and space.

THE YEAR IN REVIEW

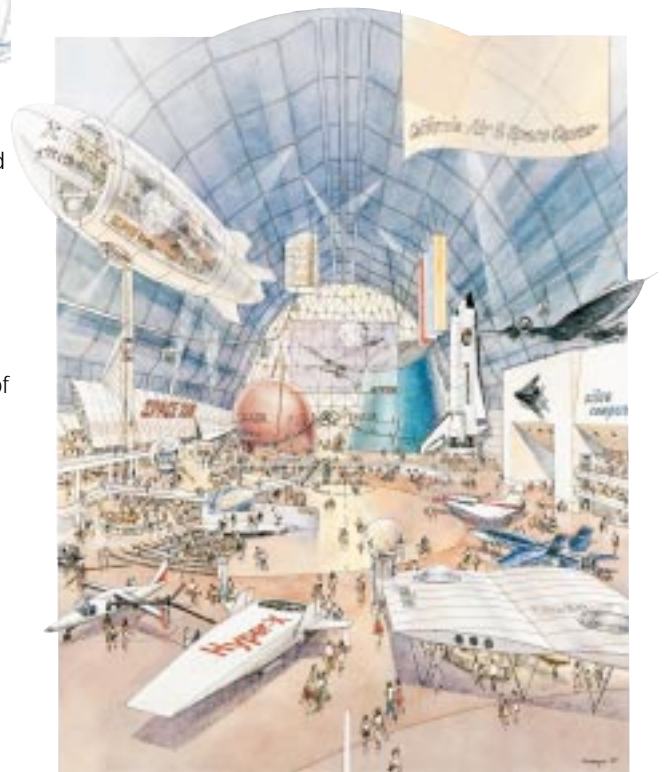
NASA LAUNCHES NASA RESEARCH PARK



With world-renowned researchers and scientists and an array of state-of-the-art national facilities, Ames Research Center is in an enviable position. Add to the mix Ames' Agency-assigned center missions in critical research areas such as astrobiology and aerospace operations systems, safety, and capacity. Toss in our unique geographic location in the heart of Silicon Valley, and there's ample reason to smile and feel great about Ames' future. But now there is something new. Something that promises to make Ames a focal point for technological leadership, not only within NASA, but in Silicon Valley and the entire Information Technology community. And this new development is not on the distant horizon. It is right HERE, right NOW!

In fact, on Dec. 8, NASA unveiled this visionary new concept—the NASA Research Park, a world-class, shared-use campus featuring 21st century research, development, and education partnerships. Ames will work with local communities to create the complex focusing on collaborations among government, academia, private industry, and nonprofit organizations in support of NASA's mission. The new complex will ultimately encompass the 2000-acre property owned by Ames Research Center.

The new NASA Research Park will feature partnerships in astrobiology, aerospace, information technology, education, and commercialization of NASA technology, primary elements of Ames' mission within NASA. Center Director Henry McDonald said that preliminary negotiations with industry, government, and academia have begun and that he hopes to finalize partnership agreements with potential onsite research collaborators within the next 12 months. Discussions have already led to



agreements with the cities of Mountain View and Sunnyvale for the California Air and Space Center (CASC), and with Stanford University and the University of California at Santa Cruz on research partnership planning.

Ames will provide opportunities for collaborative research and education facilities, with the added benefit of no security badging and easy traffic access. This scenario will facilitate a public area designated for two separate independent nonprofit education partners, the CASC and the Computer History Museum.

AMES RESEARCHERS SUPPORT MARS ROBOTIC EXPLORATION

NASA Ames researchers are playing a key role in supporting two Mars robotic exploration missions. The Mars Polar Lander, which launched on January 3, has two Mars microprobes with advanced thermal protection systems designed, tested, and manufactured at Ames. (The Mars Microprobe mission is also called Deep Space-2, the second New Millennium deep space technology-validation mission, which is managed by the Jet Propulsion Laboratory, Pasadena, Calif.)

The Mars Polar Lander is part of NASA's long-term program to explore Mars using robots. The lander will touch down on a frigid, barren steppe near the edge of Mars' south polar cap and dig for traces of water ice beneath the surface. Equipped with a robotic arm, the lander will also carry two tiny microprobes with penetrators that will smash into the surface and test new space exploration technologies.

According to Huy Tran (Code ASM), who heads Ames' thermal protection team, the Ames-developed heat shields will protect the two probes from the very high temperatures (approaching 3200° F) expected during the Mars entry with minimal recession. The

probes will impact the Martian surface with a terminal velocity of 200 millimeters per second. As the probes smash into the Martian surface, the heat shields will shatter and allow a clean penetration into the rust-colored Martian soil. The two probes will collect samples and do spectral analyses for water signatures.

To meet the reentry technology challenge, the Ames team developed a new heat-resistant material that is thin and light and able to withstand high temperatures. The new material is about one-fifth the thickness of the Space Shuttle heat shield. The new material is called SIRCA/SPLIT (Silicone Impregnated Reusable Ceramic Ablator/Secondary Polymer Layer Infiltrated Tile). The heat-shield technology was developed at Ames in early 1999.



NASA'S NEW VIRTUAL AIRPORT CONTROL TOWER OPENS AT AMES

FutureFlight Central, the world's first full-scale virtual airport control tower, opened with a ribbon-cutting ceremony at Ames Research Center. Constructed at



a cost of \$10 million, the two-story NASA FutureFlight Central was jointly funded by NASA and the Federal Aviation Administration (FAA).

"NASA's FutureFlight Central is a world-class research facility dedicated to addressing the future needs of the nation's airports," said Ames Center Director Henry McDonald. "This facility will allow NASA, the FAA, and their research partners to examine ways to increase the flow of aircraft through the national airspace system safely, efficiently, and under all weather conditions."

FutureFlight Central will permit integration of tomorrow's technologies in a risk-free simulation of any airport, airfield, and tower cab environment. The facility provides an opportunity for airlines to mitigate passenger delays by fine-tuning airport hub operations, gate management, and ramp movement procedures. It also allows airport managers an

opportunity to study the effects of various improvements at their airport. Finally, it enables air traffic controllers to provide input and become familiar with new airport operations and technologies before construction is completed. With the new NASA facility, aviation engineers and airport planners now have the ability to create synthetic environments for commercial application.

Real people interact in the live-action simulation just as in a real airport. Up to 12 air traffic controllers in the tower cab are in direct communication through a simulated radio and phone system with pilots and ramp controllers at stations on the first floor. It is anticipated that airports, airlines, and researchers will want to look primarily at the feasibility, safety, reliability, and cost benefits of technologies prior to incorporating them into airports. In addition, testing



will provide information that may assist in developing proposed changes to airport ground procedures and the construction of new airport facilities.

Computer software is integrated with the tower simulation hardware technologies at Ames to support both radar and out-the-window visual simulation. The second floor of the facility is designed to replicate a typical air traffic control tower. The tower cab has

reconfigurable site-specific displays, such as terminal area and surface radar and weather, installed based on FAA specifications. Twelve rear-projection video screens provide a seamless 360-degree on same line high-resolution view of the airport or other scenes being depicted. Powered by supercomputers, the imaging system provides a realistic view of weather conditions, environmental and seasonal effects, and the movement of up to 200 active aircraft and ground vehicles.

X-33 METALLIC HEAT SHIELD PASSES INTENSE SERIES OF TESTS

Development of a low-cost space plane took a step forward last month when one of three technologies essential to the success of the plane was declared "ready for flight." The rugged, metallic thermal-protection panels designed for NASA's X-33 technology demonstrator passed an intensive test series that included sessions in high-speed, high-temperature wind tunnels. Tests were conducted in the arc-jet facility at Ames. An arc jet is a wind tunnel that is electrically heated, exposing a test panel to very-high-temperature airflow similar to the hypervelocity flow a vehicle would experience during reentry.

Additional laboratory tests duplicated the environment the outer skin of the X-33 will encounter while flying approximately 60 miles high at more than 13 times the speed of sound. Earlier, a thermal-panel fit test successfully demonstrated the ease of panel installation and removal. The thermal protection system combines aircraft and space-plane design, using easy-to-maintain metallic panels placed over insulating material. As the X-33 flies through the upper atmosphere, the panels protect the vehicle from aerodynamic stress and temperatures comparable to those a reusable launch vehicle would

encounter while reentering Earth's atmosphere. Tests have verified that the metallic thermal-protection system will protect vehicles from temperatures approaching 1800° F.

NASA expects the metallic thermal-protection panels—developed and built by team member BF Goodrich Aerospace/Aerostructures Group in Chula Vista, Calif.—to dramatically cut maintenance time and costs associated with more fragile thermal-tile systems. Because the metallic panels on the lower surfaces of the X-33 make up the windward, aerodynamic structural shell of the vehicle, the system also will obtain significant weight savings over traditional thermal systems, while being much more durable and waterproof.

NASA LICENSES NEW EDUCATIONAL MARS CD-ROM

NASA Ames has licensed a new interactive CD-ROM that allows students to virtually explore Mars, understand the basic concepts of space exploration, and search for life in the universe. Ames developed the Mars Virtual Exploration CD-ROM as a captivating way to educate students about Mars. Ames recently licensed the CD-ROM to Modern School Supplies, Inc., Bloomfield, Conn., which plans to market the CD-ROM to schools throughout the country.

Designed for students in the fourth through eighth grades, the CD-ROM provides the equivalent of 40 hours of classroom instruction about the red planet. Developed by the Educational Multimedia Research and Development Group of Ames' Development and Communication Office, the CD-ROM also includes a teacher's guide and student logbook, which provide additional content and interdisciplinary classroom activities to complement the multimedia product.

NASA RECEIVES TOP MARKS ON FINANCIAL STATEMENTS

Out of the 24 largest government agencies, only NASA and the National Science Foundation were given "A's" on their 1998 financial statements. Subcommittee Chairperson Stephen Horn, R-Calif., issued grades to each of the 24 agencies. This is the fifth consecutive year that NASA received an "unqualified" or "clean" opinion from its auditors. A clean opinion means that the agency's financial statements are reliable.

This is also the third consecutive year that NASA received the top mark from subcommittee Chair Horn. The Agency's financial statements are consolidated from each of NASA's ten centers. If the financial reporting of any individual center does not meet the auditor's requirements, it jeopardizes the entire Agency. Ames' financial management division has proved once again to be a crucial and important component of both Center and Agency operations.

AMES PITCHES PERFECT GAME IN ISO AUDIT

This one sent them scurrying for the records book. And for the first time that anybody could remember in the history of ISO auditing of comparably sized business organizations, one facility passed the entire certification process on its first attempt without a single "finding."

That organization was NASA Ames Research Center.

On April 30, Walt Culbertson, lead auditor for Det Norske Veritas (DNV), delivered his report card on the initial certification audit for Ames to a packed house of more than 370 people in the main auditorium. It was straight A's all the way!

"Ames—you said it, you did it, you proved it," Culbertson proclaimed. "In my 17 years of auditing experience, I have never before been able to recommend certification without any findings or observations. This is a first!" Culbertson went on to praise Ames' use of flowcharting and text to document procedures, complimented the specificity

of training records, and spoke highly of the corrective action system verification process.

It was all smiles from Administrator Daniel Goldin, Center Director Henry McDonald, Deputy Center Director William Berry, and ISO Program Manager Rick Serrano. Not to mention the enthusiastic applause from the eager, somewhat nervous crowd. "Ames is NASA's Center of Excellence for Information Technology," Goldin proclaimed. "I never had any doubt that you would pass the ISO audit. Flawlessly! You didn't disappoint me."

Goldin went on to stress the importance of safety, saying that it is his number one priority for NASA, for our astronauts and pilots, for our employ-



ees, and for our contractors. He then cited Ames' record of going over a whole year without any lost workdays due to on-the-job injury.

"This is more impressive than anything," Goldin said. NASA runs a factor of 30 behind the best in private industry in terms of lost work time, he observed. "I respect them, but we are going to beat them," Goldin said. "And now Ames has accomplished something that even private industry has not achieved." Goldin said that he is delighted by this achievement by a center that "is one of my very favorite places."

GOLDIN LAYS OUT VISION FOR NASA ASTROBIOLOGY—NOBEL LAUREATE NAMED TO LEAD AMES-CENTERED VIRTUAL INSTITUTE

On May 18, NASA Administrator Daniel S. Goldin came to Ames Research Center. To say that he had a great time would be a huge understatement!

He made an inspiring speech on astrobiology and NASA's future in space that played to rave reviews. He presided over the appointment of a world-renowned scientist and Nobel Laureate to head the NASA Astrobiology Institute (NAI). And he did it all live on NASA Television before a packed auditorium and national viewing audience. Major media interest in prominent urban markets, including a story in the *New York Times* and hourly updates on CNN, did nothing to detract from the celebratory nature of the occasion. As Goldin himself observed at the end of a long but exhilarating day, "it doesn't get much better than this!"

The man tabbed to head the NAI is none other than the discoverer of the hepatitis B vaccine and the 1976 winner of the Nobel Prize for medicine, Dr. Baruch S. Blumberg. Blumberg is an expert in the fields of human biology, biochemistry, and

genomics. His scientific qualifications and his energy and enthusiasm for taking on this new challenge are unparalleled.

And Blumberg does not come alone! He brings with him a scientific review committee that is a veritable cornucopia of Nobel Laureates, a "Who's Who" of scientists and researchers devoted to astrobiological



pursuits. This will ensure that a vigorous peer review process guides the program of the Institute, a critical requirement according to the NASA Administrator.

Before announcing the Blumberg appointment, Goldin took advantage of the occasion to provide a glimpse of his view of NASA's future. He spoke of the important and integrated role that astrobiology and information technology will play. "It is not by accident that this Institute is located here in Silicon Valley," Goldin said. "One of the reasons for locating the Astrobiology Institute at Ames is to enable the synergy between Information Technology and astrobiology." This was music to the ears of Ames' life and space science researchers and information technologists. And the outcome? Of almost inestimable value, said Goldin. "Quite possibly, the rewards from this pursuit of astrobiology may eclipse the societal and economic benefits of all prior NASA activity," he suggested.

AMES' 60TH BIRTHDAY BASH BRINGS OUT THE CROWDS

"You're not getting older, you're getting better!" This now-tired bromide may actually have some merit when applied to Ames Research Center. On June 2, a "youthful" Ames threw itself a 60th birthday



celebration. It was a chance to honor the past, while looking to the future. That message certainly wasn't lost on a Center and a workforce proud of its history. But the energy and enthusiasm of this celebration were focused on the missions by which we will define tomorrow's, not yesterday's, accomplishments.

The day's events were highlighted by three separate functions. In the morning, an estimated 1200 employees gathered on the grassy area in Shenandoah plaza for an historic photograph to visually commemorate Ames' "60 years of excellence." The photo was a reenactment of the event conducted a decade ago on the Ames flightline. At noon, the Ames Exchange hosted nearly 3500

employees and their families for a free lunch and picnic on the grass. The eager hordes consumed more submarine sandwiches, beverages, and sheets of birthday cake than even the most optimistic could have imagined.

Finally, at 1:00 p.m., the Center hosted the San Jose Symphony in a free concert performing Gustav Holst's "The Planets." More than 800 people braved the cold weather to enjoy the event that was kicked off by a program featuring short presentations on Ames' history and future.

Jack Boyd, executive assistant to Center Director Henry McDonald and long-time Ames employee, gave a brief history of Ames' accomplishments.

AMES REVOLUTIONIZES INTERNET TECHNOLOGIES BY ESTABLISHING THE FIRST MULTICAST INTERNET EXCHANGE

One of the objectives of the Next Generation Internet (NGI) is to develop an infrastructure that will support nontunneled, or "native," IP multicast to allow for more efficient and more easily managed network use.

The NASA Research and Education Network (NREN), part of the NGI program, is pioneering the effort to deploy native nontunneled multicast over wide-area networks.

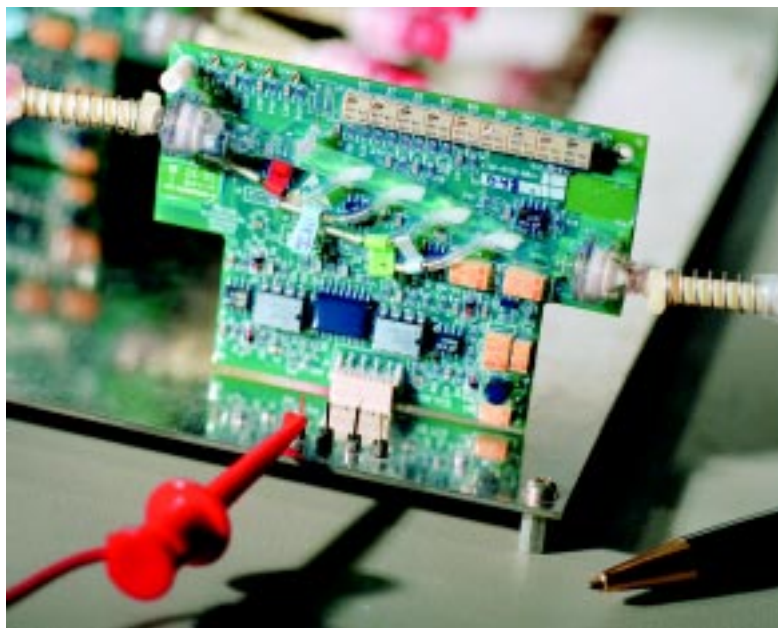
What is the MIX? NREN and the Applied Information Technology division recently accomplished a "first" in the internetworking world by establishing a Multicast Internet Exchange (MIX) at Ames. The MIX provides a multicast-friendly peering point to handle routing between IP multicast wide-area networks.

Ames has traditionally been a major peering point for national networks operated by other organizations. The MIX is housed at the Ames telecommunications gateway facility, managed by the Ames external interface group, which also houses the Ames Internet Exchange (AIX), the Federal Internet Exchange-West (FIX-W), and the NGI Exchange (NGIX).

A look ahead: NREN is pioneering the use of native IP multicast technology to support NASA missions. It is working on applications that produce multicast peak data rates of 50 megabits per second, or more than 500 times the data rate of early MBONE multicast applications and 1000 times the data rate of home modem connections.

STS-93 TO CARRY AMES SENSORS DEVELOPED IN-HOUSE

A tiny chemical lab, no bigger than a deck of cards, may evolve from an Ames-developed biology sensor device that flew onboard the Space Shuttle Columbia when it thundered into orbit on July 20. "The sensors were developed in-house," said Mike Skidmore,



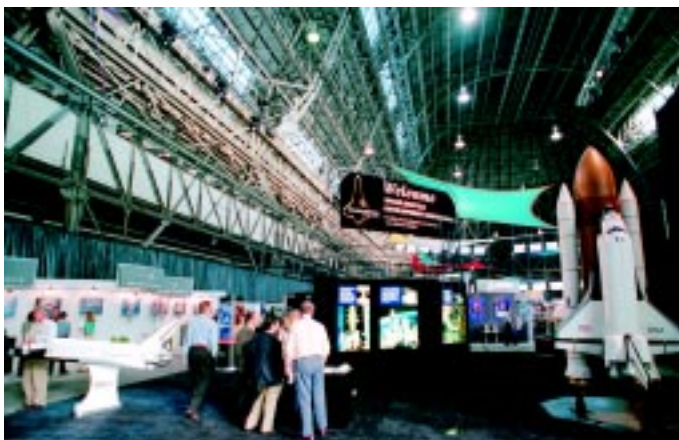
Deputy Manager of the Sensors 2000!, an Ames Code F program. During the STS-93 spaceflight, Biona-C's sensors monitored acid levels in a cell culture carried on the Shuttle. By combining Biona-C with computer electronics, pumps, and valves, Ames scientists are working toward the eventual development of a tiny, automated chemical laboratory.

"Project by project, we are making miniaturized parts that will comprise a portable chemistry lab no bigger than a shoebox or a deck of cards—and maybe even smaller," said Carsten Mundt, an electrical engineer in the Sensors 2000! program office. "One of our goals is to build smaller and smaller sensors able to make various kinds of physiological, chemical and biological measurements."

Scientists in the Ames Sensors 2000! group developed Biona-C in cooperation with the Walter Reed Army Institute of Research, Silver Spring, Maryland. In November 1997, scientists at Ames and Walter Reed outlined requirements for the instrument package in the Cell Culture Module aboard STS-93 designed to measure pH in cell cultures.

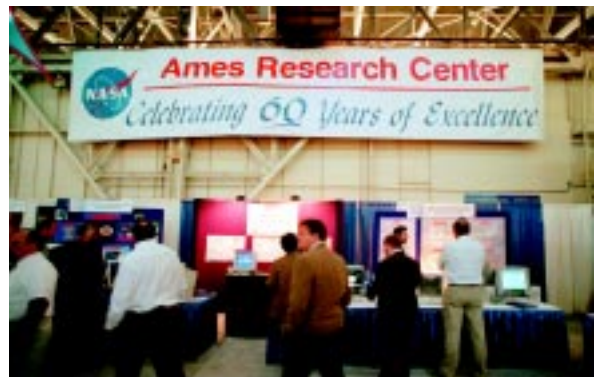
SHUTTLE UPGRADE CONFERENCE DRAWS MAJOR INTEREST —LOCAL AND NATIONAL COMPANIES BOOST ATTENDANCE

On July 28–30, 1999, Ames' historic Hangar 1 and the Moffett Training and Conference Center hosted a series of displays, panel discussions, and technical sessions that attracted a registered crowd of over



700 participants, far in excess of the 300 anticipated. Then, on Saturday, the Space Technology and Education open public event drew an estimated additional 7500 visitors. Although the large crowds presented some logistical challenges, they also made for free, wide-ranging, and open discussions of new ideas and concepts, and a greater public awareness of the Shuttle program and Ames' role in it.

Tours of Ames facilities were provided to over 100 visitors during the conference, and Ames personnel participated in two key technical sessions on Information Technology and Space Thermal Systems. Media coverage of the event was surprisingly strong and enthusiastic.



On Saturday, co-hosts State Senator Liz Figueroa and State Assemblywoman Elaine White Alquist led a host of regional and local political dignitaries who paid homage to NASA's educational programs and spoke of the need to challenge our children and ourselves with a greater range of education-related activities. Astronauts Paul Lockhart and Andy Allen were on hand to sign posters commemorating the 30th anniversary of the first human to step on the moon. Visitors also viewed the 50 or so exhibits and interactive displays that had been set up as part of the conference program.

NAS, SGI COLLABORATE ON 512-PROCESSOR ORIGIN 2000

Silicon Graphics Inc. (SGI), a leader in the construction of supercomputers, and the NAS Systems Division (Ames Research Center), a leading user, have a common interest in perfecting high-performance computing systems for the needs of the research community. In 1998, that joint interest became concrete in the form of an official memorandum of understanding, calling for the joint development of a 256-processor machine SGI Origin 2000 supercomputer. Completed in November 1998, the 256-processor machine, named Steger, surpassed benchmarks set by the division's fastest Cray supercomputers by fivefold. Steger, the first "single system image CC-NUMA" machine to reach 256 processors, has since become a commercial product of SGI, with a handful sold to some of its major customers.

Now NAS and SGI have expanded their partnership. In May, NASA Administrator Daniel Goldin and SGI officials signed a new agreement calling for the creation of the world's largest single system image shared-memory computer, a 512-processor Origin 2000. SGI delivered the system to the NAS Facility in July. When running highly parallel software, researchers anticipate the 512-processor machine will outperform its 256-processor cousin by a factor of three or more.

Division managers named the 512-processor machine Lomax after the late Harvard Lomax. Lomax was chief of the Ames Computational Fluid Dynamics (CFD) branch from 1970 to 1992. The machine has 196 gigabytes of memory and supports 1.74 terabytes of attached RAID storage (Redundant Arrays of Inexpensive Disks). The 512-processor SGI Origin 2000 is currently the largest single-image



system in existence, with one operating system and a single address space. Lomax is part of the Information Power Grid testbed and is employed for scaling studies and computational fluid dynamics research.

Some portions of summary reproduced from Gridpoints: The NAS Systems Division Quarterly publication, Winter 1999.

Articles featured in the "Year In Review" section of the 1999 Annual Report are reproduced from Astrogram Newsletters.

AMES 1999 SPINOFFS

E-MAIL ON THE MOVE

Check your pocket...you've got mail! Technology originally developed at NASA now lets users send and receive electronic mail (e-mail) through regular or cellular telephones using a small, hand-held unit.

PocketMail® device by PocketScience™ Inc. is a hand-held e-mail device that uses technology originally developed at NASA's Jet Propulsion Laboratory.



Technology Commercialization Center, PocketScience™ was able to use space probe communications technology and adapt it for ad-



vanced signal processing on Earth. The idea behind the technology is to overcome the limitations of current mobile messaging solutions and provide access to e-mail anywhere. PocketScience™ created its first offering, the PocketMail® device. PocketMail® device makes it possible to send and receive e-mail from any-

PocketScience™ Inc., of Santa Clara, California, is a privately held company founded in 1995, aimed at making mobile e-mail service not only affordable, but easy to use. The company is pursuing its mission by melding key technologies, expertise in consumer electronics and electronic messaging, and strategic partnerships.

At its inception, PocketScience™ was a member of the NASA Ames Technology Commercialization Center. A new hand-held device uses technology originally developed at NASA's Jet Propulsion Laboratory. Through its involvement with Ames'

where in the world without turning on a computer. The device gives regular e-mail users a practical alternative to laptop computers and wireless devices when trying to send e-mail on the go. International travelers no longer have to be confronted with the nightmare of incompatible electric systems and telephone jacks while far from their home country.

The mobile messaging device also permits the transmission of faxes. The device operates by holding it against a phone handset and pushing a button. Even under the harshest conditions, the small, 9-ounce portable unit, can send and receive

e-mail through most phones worldwide, including cellular, cordless, Integrated Services Digital Network (ISDN), office and hotel Private Branch Exchange (PBX) phones, and pay phones. In airport terminals, on busy street corners, and in other noisy locales, the device functions by incorporating special modulation schemes, error correction, data compression, and data communications protocols. The technology is packaged to fit in a shirt pocket, runs on two AA batteries, and is about the size of a calculator. A modest monthly charge, beyond the initial cost of the electronic device, gives users access to e-mail services. Users of the device compose their message, dial a nationwide toll-free access number, then push one button while holding the device against the telephone handset to send and receive messages. No cables or special connectors are needed. By employing burst packet communications, no lengthy log-on is needed. The entire process usually can be completed in less than a minute.

Electronic mail has been on a spectacular growth curve. Its phenomenal climb as a major communication tool is supported by research surveys. One study suggests the number of e-mail users in the United States alone is expected to grow from 75 million in 1998 to 135 million in 2001. And those users will transmit, in the U.S., as many as 500 billion messages in 2001. Another survey statistic shows that Internet users check their e-mail at least once a day, a habit that is on the rise from previous years. "With e-mail rapidly becoming a preferred way to stay in touch with friends, family, superiors, staff, or clients, it's only natural that people will also want to be able to access and respond to their e-mail while away from their homes and offices," states a

corporate background paper developed by PocketScience™. The first PocketMail® device-enabled products have been announced by JVC and Sharp Electronics. Several other U.S. and international consumer electronics manufacturers are currently evaluating PocketMail® technology for inclusion in their next generation of products.

PocketScience™ is a trademark of PocketScience, Inc.

PocketMail® is a registered trademark of PocketScience, Inc.

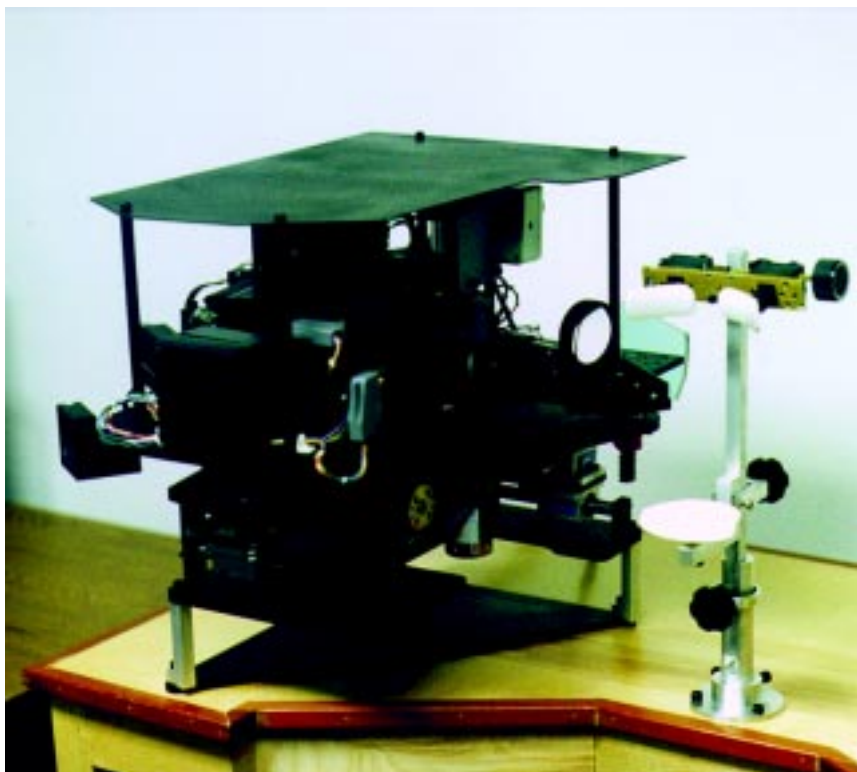
Reprinted from Spinoff 1999 Publication.

AMES 1999 SPINOFFS

THE EYES HAVE IT

Serious buffeting that may occur when flying at high speed and low altitude can create visual blurring, hindering a pilot's ability to fly safely. NASA-funded research into the muscular physiology of eye vibration was the impetus for an optical instrument,

The Eyetracker, built by Fourward Optical Technologies, can precisely monitor eye movements, benefiting the medical field in various ways, from neurological diagnosis to blood flow monitoring.



now in medical use, that accurately measures eye movements. Starting as far back as 1965, NASA's Ames Research Center contracted with the Stanford Research Institute (SRI) International of Menlo Park, Calif., to model the human visual accommodation system, starting directly with the retinal image. This research was directed at how the major muscle systems control the human visual system. Although a considerable amount of experimental information

had been gathered regarding each of these systems, there was scant understanding of how control was actually achieved.

One question that had gone unanswered was the voluntary and involuntary aspects of the human eye. Several years of incremental NASA funding helped foster SRI-built eyetracking devices. These tools

were able to anticipate, track, and monitor involuntary ocular movement horizontally, vertically, and with respect to depth of field. This development did not go unnoticed by leading academic and research institutions as an important instrument for understanding the visual system.

Since 1988, Fourward Optical Technologies, Inc., of San Marcos, Tex., has been manufacturing and marketing the Dual-Purkinje-Image (DPI) Eyetracker under an exclusive license.

Purkinje images are four

reflections produced from the front and rear surfaces of the cornea and lens. By observing the movement of the first and fourth Purkinje images with the DPI Eyetracker, the direction of gaze over a large, two-dimensional (2-D) visual field can be determined with great accuracy. The instrument operates with infrared light, requires no attachments to the eye, and is not disruptive to normal vision. Since its introduction by SRI, the Eyetracker has

gone through several generations of development. The price of the early device was cut by more than half, making it suitable for clinical medical use.

Applications of the Eyetracker are impressive. In cases of ocular bleeding, lasers can be used to stem the flow. The Eyetracker makes it possible to accurately target these problem areas, increasing the accuracy and the effectiveness of the treatment. Also, various brain disorders can now be diagnosed, as the Eyetracker can zero-out the eye's involuntary movements during diagnosis. Working in concert with lasers, the Eyetracker can assist non-invasive determination of a patient's circulatory health. By accounting for the natural involuntary movements of the eye, the Eyetracker enables the operator to monitor blood flow by accurately targeting the retinal capillaries for Doppler blood flow studies. The Eyetracker has a pointing accuracy on the order of one minute of arc and a response time on the order of one millisecond. By attaching Fourward Optical Technologies' Infrared Optometer to the device, continuous measurement of eye focus is possible, producing a 3-D Eyetracker. Eyetracker units are installed in over 11 countries around the globe, in addition to 30 or more sites in the United States. Current and potential applications of the Fourward Optical Technologies' DPI Eyetracker include analysis of visual perception, mapping retinal features, neurological investigation, drug evaluation, and even the analysis of advertising material. No doubt the company has an eye toward the future.

Reprinted from Spinoff 1999 Publication.

OUTREACH ACHIEVEMENTS

Problem solving is what NASA has long been about. The space agency's men and women offer their talents, time, and facilities to work out difficult challenges that confront our nation. Each year, many success stories underscore NASA's problem-solving abilities and a willingness to cultivate partnerships for the public good.

A Sensors 2000! team at the Ames Research Center has produced a "pill transmitter," which monitors body temperature, pressure, and other vital signs in the womb, and radios this critical information to physicians. Nearly every time doctors operate on a fetus, the mother will later undergo preterm labor that must be monitored. Preterm labor is a serious problem that is difficult to predict and monitor with conventional equipment, and often leads to the death of the baby. Thanks to the Ames effort, prototype versions of pill-shaped devices are being designed. Placed in a woman's body through endoscopic surgery techniques, these devices can measure and transmit data on acidity in the fetus, with the future of measuring electrical activity of the fetal heart. These pill transmitters are also being studied for monitoring physiological changes in astronauts during space travel.

For over 20 years, a foam developed by researchers at the Ames Research Center has been used in many applications. From wheelchairs to airplane passenger seats, the material, often referred to as temper foam, is one of the most widely used NASA inventions. The material is a cell polymeric foam with "slow springback" properties.

Be it saving an historic flag, helping reshape the hot and bothersome landscape of the city, or creating life-saving technologies for babies, NASA know-how is being used to advantage in many ways to sustain and enhance the quality of life on Earth.

GIVING BACK TO THE COMMUNITY

COMMUNITY OUTREACH

ADOPT-A-FAMILY

Each year, the employees of the Office of the Chief Financial Officer join together to make the holiday season special for those less fortunate than they are. For the last six years, they have sponsored two or three families as part of the Getting Involved for the Season (GIFTS) program at the Mountain View Support Network for Battered Women. The Acquisition Division has also joined this effort and sponsored their own families the last two years. They receive wish lists and collect donations of new clothing, toys, and gift certificates for their families. For the last few years, they have focused on contributing gift certificates for clothing, toys, and groceries so that the mothers have the opportunity and pleasure of shopping for their own children. The generosity and thoughtfulness of these employees, exemplifying the spirit of Ames, made the holiday season special for these families, as expressed by their many thank you letters.

AMES AEROSPACE ENCOUNTER

Created for fourth-, fifth-, and sixth-grade students, NASA's Ames Aerospace Encounter is a unique, interactive program designed to stir young people's imaginations and fuel their enthusiasm for science, mathematics, and technology. Located in a renovated supersonic wind tunnel, this classroom facility makes math and science curricula come alive through cooperative discovery.

DISASTER ASSISTANCE RESCUE TEAM (DART)

DART was formed in 1986 at the request of the Director of Ames Research Center. The intent was to train and equip a team capable of responding to the type of disasters that the Center would likely encounter. It began as a small group of volunteers with few skills and very little equipment. Today, it is a fully functioning emergency response team that is not only capable of dealing with potential Center disasters, but is also capable and prepared to respond off Center to support the community as a fully functional Urban Search and Rescue Team. DART is one of this country's most qualified and best-equipped emergency response teams.

EDUCATOR RESOURCE CENTER

The Educator Resource Center provides resources to teachers so they may develop their own educational programs. Teachers gather ideas, do research, and duplicate audiovisual materials. Educator Resource Center materials reflect NASA research and technology development in such curriculum areas as life science, physical science, astronomy, energy, Earth resources, the environment, mathematics, and careers in aerospace.

JASON

The JASON Project, named after the Greek mythological character who reclaimed the Golden Fleece, embodies Robert Ballard's goal of showing kids that science and technology can be exciting and accessible. Ballard found the wreckage of the sunken Titanic in 1985 and started the project after receiving 15,000 letters from kids who wanted to know every detail of his discovery. The rest is history—and a valuable learning and educational experience for thousands of students and their teachers.

"QUEST" – THE K-12 INTERNET INITIATIVE

Located on the Ames Home Page, QUEST provides support and services for schools, teachers, and students to fully utilize the Internet, and its underlying information technologies, as a basic tool for learning. At this web site, students can interact with the people of NASA, join in select NASA events, and access a wealth of information.

SPACE CAMP

Ames worked with the city of Mountain View to bring Space Camp California to Moffett Field. Although Space Camp California is not operated by NASA, onsite land and services are made available to the Space Camp Foundation, making this educational adventure possible.

SPEAKERS' BUREAU

The Speakers' Bureau provides speakers for educational institutions, business organizations, service clubs, and professional and technical societies. Employees volunteer their time and speak to these groups on a wide range of topics, including space, astrobiology, aeronautics, and Information Technology.

RECOGNIZING EXCEPTIONAL PEOPLE

NASA 1999 SOFTWARE OF THE YEAR AWARD

REMOTE AGENT - (CO-WINNER)

The Remote Agent (RA) is a reusable artificial intelligence software system designed to allow spacecraft, life-support systems, chemical plants, or other complex systems to be operated robustly with minimal human supervision, even in the face of hardware failures or unexpected events. In the week of May 17, 1999, the RA became the first model-based artificial intelligence closed-loop control system to take command of a spacecraft, *NASA's New Millennium Deep Space One*, which was 65 million miles from Earth. It did so with three onboard modules called the Livingstone system: the Planner/Scheduler, which generated the abstract and flexible plans specifying the basic activities that needed to occur in order to accomplish the mission goals; the Smart Executive system, which intelligently executed mission plans generated on board; and finally, the Mode Identification and Recovery system, which inferred and diagnosed anomalous conditions on board the spacecraft.

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Mike Wagner, Ames

Brian Charles Williams, Ames

VIRTUAL CLINIC - (RUNNER UP)

In a virtual clinic experiment to promote medical consultation and interaction between remote and major clinics, NASA Ames linked with surgeons and physicians at Cleveland Clinic, Stanford Medical Center, Salinas Valley Memorial Hospital, and the Navajo Nation at the Shiprock Service Unit. The software developed at Ames Research Center will permit these interactions with the images from the individual sites as the patient data are discussed in realtime.

CONTRIBUTORS:

Muriel Ross
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Samuel Linton
Kevin Montgomery
Steven Senger
Xander Twombly

1999 SPACE ACT BOARD AWARDS

DISTRIBUTED REMOTE ANALYSIS SYSTEM (DARWIN)

DARWIN is a distributed NASA-wide meta-data archive and web application for remote access to and analysis of wind tunnel data. Using DARWIN, aerospace engineers can examine and manipulate the data using tables, 2-D and 3-D plots, and visualization tools. During a wind tunnel test, the data become available in near real time. DARWIN can compare disparate data systems with different measurements from different platforms.

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Costandi Wahhab

Brian Johnson

Alex Shaykevich

Roberta Marrieta

Darrell Evans

NASA DEBAKEY VAD

Scientists from NASA Johnson Space Center and NASA Ames teamed with cardiovascular surgeons Debakey and Noon to develop a fully implantable, miniaturized cardiac ventricular assist device.

Specifically, the Ames team applied CFD adapted from their work on the Shuttle engine design to bring better understanding of CFD processes inside the device under varied operating conditions.

CONTRIBUTORS:

Dochan Kwak

Cetin Kiris

REHYDRATION BEVERAGE

The Rehydration Beverage replaces sodium chloride in the blood plasma, helping to restore and maintain plasma fluid. Decreased volume of this fluid can reduce work capacity, induce fatigue, and contribute to hypotension and fainting. The rehydration can be particularly helpful to astronauts during and after reentry into the Earth's atmosphere.

CONTRIBUTOR:

John Greenleaf

1999 PRESIDENTIAL RANK AWARDS

PRESIDENTIAL RANK OF DISTINGUISHED EXECUTIVE

James O. Arnold

PRESIDENTIAL RANK OF MERITORIOUS EXECUTIVE

David D. Morrison

1999 NASA HONOR AWARDS

OUTSTANDING LEADERSHIP MEDAL

Carol W. Carroll
Kenneth M. Ford
Harry W. Gobler
Sandra G. Hart
G. Scott Hubbard
J. Victor Lebacqz
Meyya Meyyappan

EXCEPTIONAL ACHIEVEMENT MEDAL

Sylvia A. Cox
James A. Franklin
Kelly J. Kasser
Siamak Yassini-Fard

EXCEPTIONAL ENGINEERING ACHIEVEMENT MEDAL

Jeffrey D. Bull

EXCEPTIONAL SERVICE MEDAL

Edwin F. Erickson
Doris M. Furman
William S. Hindson
Gail E. James
Frances R. Jonasson
Kristina A. Robles
Randy D. Rodrigues
Cdr. James G. Scott, USN

PUBLIC SERVICE MEDAL

Thomas A. Dougherty
Lynne J. Englebert

EXCEPTIONAL SCIENTIFIC ACHIEVEMENT MEDAL

Jeffrey N. Cuzzi

GROUP ACHIEVEMENT AWARD

1998 Ames-Moffett Flood Response Team
Ames Major Wind Tunnels and Simulators ISO
Implementation Working Group
Aviation Performance Measuring System Research
Project Team
Lunar Prospector Team
Neurolab Project Team
Slender Hypervelocity Aerothermodynamic Research
Probe-B1 Flight Experiment Team
Tilt Rotor Aeroacoustic Model Duits-Nederlandse
Wind Tunnel Team

1999 AMES HONOR AWARDS

ADMINISTRATIVE

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Theresa M. Nogales-Liang

BEST FIRST PAPER BY A JUNIOR RESEARCHER

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GROUP/TEAM

Code J ISO Team
 The ISO Documentation Tiger Team
 Lunar Prospector Science Team
 Lunar Prospector Navigation Team

HEADQUARTERS EMPLOYEE

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SECRETARY/CLERICAL

Donna Z. Lacy
 Shirley K. Prosper
 Rose M. Van Zytveld
 Debbie C. Wilson

SUPERVISOR/MANAGER

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 Clinton G. Herbert, Jr
 John E. Humbert

TECHNICAL SUPPORT

Astrid L. Terlep

MENTOR

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 Dallas G. Denery
 John N. Perry

SCIENTIST

Lawrence P. Giver

STUDENT

Michael J. Landewe

TECHNICIAN

Richard R. Toner
 Robert L. Walker



MANAGEMENT DISCUSSION AND ANALYSIS

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MANAGEMENT INITIATIVES

SAFETY

In FY00, the Center will be implementing the Safety Accountability Program to reduce the number of hazards on the job and significantly improve safety. The Safety Accountability Program is based on programs in private industry that have been proved effective. The new initiative includes the following key elements:

- *Clear and specific safety policy*
- *Executive Safety Committee chaired by the Center Deputy Director*
- *Reemphasis on system safety*
- *Safety Accountability Program Core*
- *Safety training for all employees*
- *Annual Safety Week*
- *Hotline*
- *Union Management Safety Committee*

All elements are integrated into a single management plan that is designed to change behavior and improve accessibility to management. The complete integration includes a new management culture shift to accountability, combined with metrics, pay for performance, and real-time feedback to management via automation.

SYSTEMS MANAGEMENT

Ames Research Center (ARC) is committed to improving the quality and consistency of the Center's approach toward systems management, which is the integration of systems engineering, system safety, and risk assessment, product development, and cost estimation and analysis. The Center has established a Systems Management Office reporting to the Center Director to ensure that the processes, infrastructure, and oversight mechanisms are in place to implement systems management in a disciplined and thorough manner, and to ensure that its effectiveness can be verified independently. The initiatives to be implemented by the Systems Management Office for FY00 include:

- *Training and Skill Development*
- *Tools Development and Deployment*

ISO 9001

ARC utilizes world-class leadership in the effective management of the programs and research it performs. As part of this effort, ARC focuses on the area of quality system refinement and improvement. By doing so, ARC will demonstrate that it has a Quality Management System in place that continues to meet or exceed the ISO 9001 worldwide standard. The implementation of an ISO 9001 quality system in FY99 clarified responsibilities and interfaces within ARC, minimized knowledge loss due to turnover, improved first-time conformance to requirements, and increased customer satisfaction. Many of the

Center's industrial partners are already ISO certified. ISO certification has put ARC on par with the rest of the Agency and our customers. Surveillance audits will be performed every six months, and a full quality system audit will be performed every three years. The Center as a whole became certified on April 30, 1999, with a perfect score. This monumental effort on the part of management and staff sends a message to our customers that we have the skills and ability to design and develop top-quality aeronautical space and information technologies, software, and hardware products.

HUMAN RESOURCES

The ARC has begun the development and implementation of a Human Resources Initiative to place greater emphasis on the fact that our people are our greatest asset. This initiative requires formal, continuing management education for all supervisors and the creation of Individual Development Plans for all staff members. It also creates a process for management accountability to implement these requirements.

PROGRAM AND PROJECT MANAGEMENT DEVELOPMENT

The ARC Program and Project Management Development Program has been initiated to accelerate the development of the next generation of Center and Agency program and project leaders. The ARC program is building on the academic structure of the Agency's Academy of Program and Project Leadership (NASA APPL) to train and provide developmental assignments to enable a new cadre of ARC program and project management talent as well as to enhance the skills of our existing leaders. The ARC Training and Development group has built a strong collaborative relationship with NASA Headquarters and now serves the Agency as the Western campus for many of the Academy's training programs.

FULL COST PRACTICES

ARC has begun the implementation of full cost practices and will continue to improve the cost-effectiveness of mission performance through complete implementation of the Agency's Full Cost Initiative. This initiative will drive policy and practice improvements in the accounting, budgeting, and management areas that will support "full disclosure" on activities for more fully informed decision-making and better performance measurement. The planned improvements include categorizing costs as direct, service, and administrative (G&A). The Full Cost Initiative also ensures compliance with recent legal and administrative guidance, including the 1990 Chief Financial Officers Act, 1993 Government Performance and Results Act, 1993 National Performance Review, Federal Financial Management Improvement Act of 1996, and NASA's 1995 Zero Base Review.

INTEGRATED FINANCIAL MANAGEMENT SYSTEM

In addition to operating the Center's legacy systems, ARC is deeply involved with the Agency-wide effort to standardize and improve the financial and business management processes and systems in the Agency. The ARC Integrated Financial Management Program (IFMP) team is actively participating in all aspects of the Agency-wide program, including reengineering business processes, configuring and testing the system, and preparing employees to work in the new environment. The IFMP System will replace the Agency's existing business management environment, which comprises decentralized, nonintegrated systems, originally developed to satisfy unique Center requirements. The IFM System will provide the NASA Strategic Enterprises, Lead Centers, Lead Program Managers, and Center Directors with accurate and timely financial information to support decision-making and to enable strategic management. In addition, the system will also be designed to satisfy the needs of external customers who require financial information from NASA.

EDUCATION

As stated in the NASA Strategic Plan, one of NASA's roles is to inspire achievement and innovation. In order to accomplish this, NASA uses its unique resources to support educational excellence for all. Ames delivers the NASA Education Program within the framework of the NASA Implementation Plan for Education, 1999–2003. The key Operating Principles of this plan are Customer Focus, Collaboration, Diversity, and Evaluation. The education function at ARC is strategically dispersed throughout the Directorates; in fact, all major technical endeavors at ARC contain educational outreach components.

This scenario has increased the magnitude, diversity, and technical excellence of ARC's education programs. The wide ranges of ARC's education programs are constantly being refined, and new programs are being introduced to better serve the needs of the educational community within the Bay Area, the State of California, and ten other Western states.

EQUAL OPPORTUNITY/DIVERSITY

ARC strongly supports the principles of equal opportunity and endorses achieving diversity in the workplace. Everyone working at ARC is valued and no one is excluded on the basis of race, sex, ethnicity, sexual orientation, color, religion, age, disability, or any other nonmerit-based factor. The Center fosters and maintains a work environment that respects and values individual differences and is reflective of the entire range of communities that the Center serves.

ARC DEVELOPMENT

ARC is embarking on a bold new vision to create a collaborative research park (NASA Research Park), which brings together premiere talent in the areas of astrobiology, information technology, and aerospace technology. The transformation of ARC's unused capacity into a unique environment for enhancement of NASA's programmatic initiatives, as well as the Agency's commercialization, education, and outreach goals, will integrate three key components:

- *A World-Class Campus for Research, Education, and Learning—ARC will develop a world-class campus for research and learning that will utilize ARC's unique stock of buildings and partnerships with local government, academia, industry, and nonprofit organizations. With its notable military history, prominent architecture, and availability of land, ARC will be an ideal place where NASA, its collaborative partners, and the public can promote advances in aerospace and aviation technology, understand advances in Information Technology, and explore the outer limits of the universe. Public displays, interactive exhibits, school programs for students and teachers, and lecture programs will be featured on the campus.*
- *A Center for Entrepreneurship and Innovation in partnership with academia and industry, NASA will promote entrepreneurship and innovation at ARC. By taking advantage of its proximity to leading entrepreneurs and heads of innovative organizations, NASA and its partners can support the development of business incubators focused on high-technology and biotechnology industries. Linkages can be formed with business education programs to provide forums, seminars, executive lecture series, and other venues to facilitate the exchange of information and experience to solve real-world business problems related to technology innovation, technology commercialization, and technology management.*
- *A Community of scientists, engineers, students, and educators—ARC will create a unique community of research scientists, students, and educators with a shared mission to advance human knowledge of space, the Earth, and society. A lively and vibrant community will attract industry.*

NASA will provide critical public safety services and other services typically furnished by municipal government.

OPERATIONS

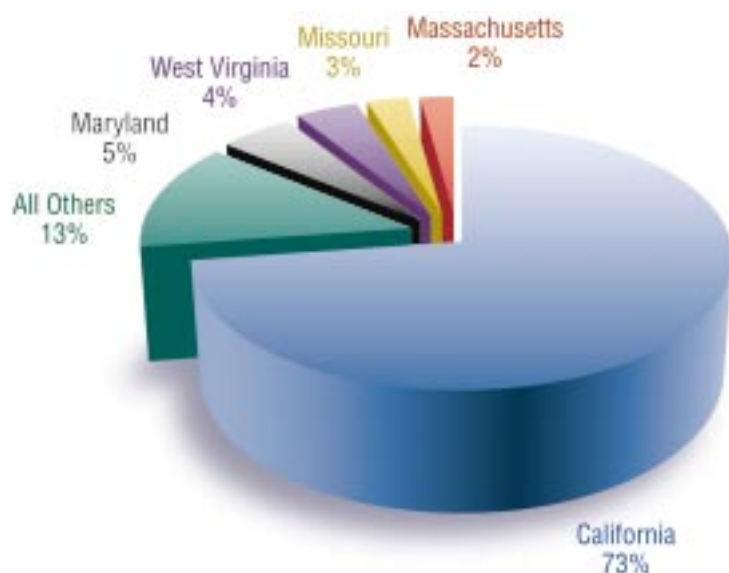


succeeding in implementing a variety of new initiatives at the Center. This is evidenced by a 2.5-percent growth in the Ames budget from FY99 to FY00. The 2000 budget is estimated at \$625.1 million, with a similar upward trend through the budget horizon. In this era of limited personnel resources, Ames is striving to improve its business processes to ensure accomplishment of its mission in the most efficient manner. Significant emphasis is placed on workforce reporting, because this will be the foundation for accurate full-cost budgeting and accounting.

BUDGET INFORMATION

Ames' budget authority for FY99 was \$609.5 million, reflecting a 4.4-percent increase from the Center's 1998 budget authority. Ames has aggressively implemented financial metrics for all its programs. The Center is attempting to achieve 100-percent commitments and obligations and 83-percent accruals on its current year funding. Ames has made significant progress in achieving these goals. In accomplishing the financial metrics, Ames substantiates its budgetary requirements through timely utilization of its financial resources. Ames is

TOP FIVE STATES BY PRIME CONTRACT AWARDS DURING FY99



ECONOMIC IMPACT

Ames Research Center significantly impacts the local and national economy. In accomplishing its mission, Ames spends a significant portion of its resources on contracts to acquire goods and services. As of September 30, 1999, Ames awarded approximately \$516 million for prime contracts. Of that figure, approximately \$378 million, or 73 percent, remained in California.

U.S. GEOGRAPHICAL DISTRIBUTION OF PRIME CONTRACTS DURING FY99 (IN THOUSANDS)

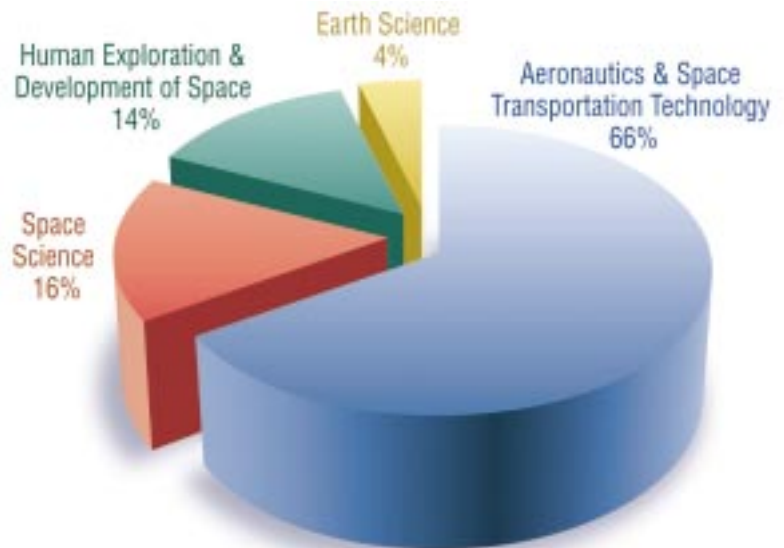
STATE	DOLLARS AWARDED	PERCENT OF TOTAL
Alabama	\$ 669	0.13%
Arkansas	44	0.01%
Arizona	1,613	0.31%
California	377,569	73.15%
Colorado	3,533	0.68%
Connecticut	1,896	0.37%
District of Columbia	5,148	1.00%
Florida	644	0.12%
Georgia	1,346	0.26%
Hawaii	443	0.09%

STATE	DOLLARS AWARDED	PERCENT OF TOTAL
Idaho	178	0.03%
Illinois	620	0.12%
Indiana	4,184	0.81%
Iowa	595	0.12%
Kansas	460	0.09%
Kentucky	192	0.04%
Louisiana	453	0.09%
Maine	65	0.01%
Maryland	27,664	5.36%
Massachusetts	12,767	2.47%
Michigan	74	0.01%
Minnesota	2,402	0.47%
Mississippi	168	0.03%
Missouri	15,849	3.07%
Montana	1,673	0.32%
North Carolina	1,172	0.23%
Nebraska	175	0.03%
Nevada	300	0.06%
New Hampshire	290	0.06%
New Jersey	1,708	0.33%
New Mexico	3,434	0.67%
New York	2,563	0.50%
Ohio	550	0.11%
Oklahoma	100	0.02%
Oregon	846	0.16%
Pennsylvania	4,354	0.84%
Rhode Island	516	0.10%
South Carolina	138	0.03%
Tennessee	1,975	0.38%
Texas	2,373	0.46%
Utah	159	0.03%
Vermont	35	0.01%
Virginia	9,419	1.82%
Washington	1,527	0.30%
West Virginia	18,666	3.62%
Wisconsin	5,587	1.08%
TOTAL	\$ 516,136	100.00%

WORKFORCE

NASA has made significant progress in its movement toward a smaller, but more focused, civil service workforce. In fact, more than three quarters of the 7500 full-time equivalent (FTE) reductions needed in its civil service workforce have already been accomplished through voluntary measures

such as separation incentives, hiring freezes, attrition, and aggressive outplacement. NASA began its restructuring efforts in 1993 when it had approximately 25,000 civil servants at its Headquarters and Centers. By the year 2000, NASA plans to have fewer than 18,000 civil servants. This workforce size was deter-



mined following a comprehensive Zero Base Review that redefined roles and missions and program management structures consistent with outyear funding levels. The staff reduction represents a 28-percent cut from 1993 levels and will result in the smallest civil service workforce since the 1960s.

In 1999, Ames Research Center continued to work toward achieving its targeted FTE complement level. Some of the Center's initiatives include:

- Use of buyouts in 1994, 1995, 1997, and 1998 to achieve nearly 300 separations and to reach the target employment levels early;
- Reorganization to reduce the number of organizations and supervisory ratio;
- Delegation of selected management authorities to nonsupervisory working managers, group leaders, and team leaders as the span of control increases for supervisors;

- *Expanded use of teams to manage complex or cross-organizational projects;*
- *Streamlining of its reorganization procedures, empowering division and directorate managers with more authority to make organizational changes;*
- *Increasing utilization of term employees;*
- *Increasing management's awareness of FTE tracking and full cost accounting methods.*

Normal buyouts and attrition have brought ARC to its FY00 and outyear FTE target. Replacement continues to be critical to establishing and/or maintaining expertise in key areas. Although skill mix remains an issue, increased mentoring, reassignment of personnel to critical program areas, career development, and reeducation will enable the staff to carry out the assigned missions. Mechanisms to facilitate the transition of employees include the establishment of a

competency-based learning system, the expansion of onsite university classes, an increased focus on technical training, and emphasis on developmental feedback. Additionally, career assessment and a career transition curriculum will continue to be encouraged for all employees.

Ames' downsizing is complete, and the Center will work to stabilize the optimal balance of skills in the workforce. Ames has established itself as the Agency's Center of Excellence for Information Technology, leading NASA's study of the living universe, and the Center continues its leadership role in the conduct of aerospace and space research needed to expand the frontiers of knowledge, to improve America's competitive position, and to inspire future generations.

REIMBURSABLE AGREEMENTS

Reimbursable agreements are binding agreements with customers for NASA to sell or rent materials, equipment, or services. In 1999, Ames had reimbursable agreements totaling \$46 million. Reimbursable agreements totaled \$41 million for 1998, and \$48 million for 1997. Ames' largest reimbursable customer continues to be the Army, representing 36 percent of the reimbursable dollars received in 1999. Other Federal Agencies represented Ames' second largest reimbursable customers with 21 percent, followed by the Department of Transportation with 12 percent.



PURCHASE CARD PROGRAM

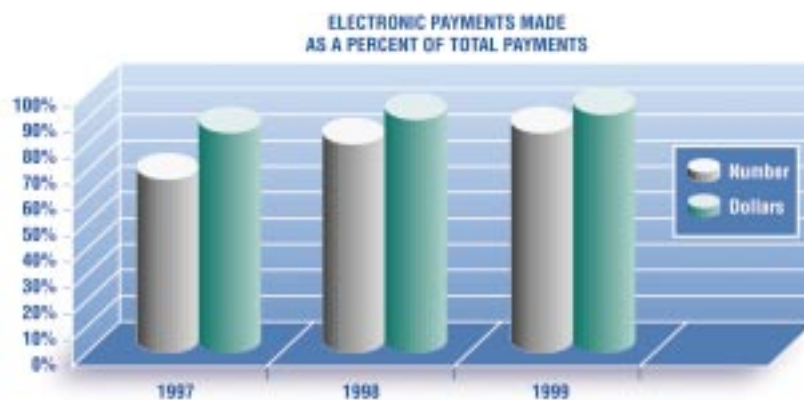
The United States Government purchase card program, started in 1989, achieves Government-wide savings by reducing, by as much as 14 percent, the administrative costs associated with official small purchases of commercially available goods and services. Use of the purchase card expedites the acquisition of essential supplies and services, streamlines payment procedures, and reduces the administrative costs associated with traditional paper-based payment methods. Ames began participating in the purchase card program in 1990. The Center had less than 20 cardholders at that time. Since then, it has enjoyed widespread acceptance because of its efficiency and ease of use. In 1999, there were more than 240 cardholders, with an annual purchase total of 6.2 million. Ames will continue to use the purchase card to increase financial and procurement efficiency and reduce administrative costs.

PROMPT PAYMENT ACT

The Prompt Payment Act requires Federal Agencies to pay their bills on a timely basis. Interest penalties are imposed on any payment not made in accordance with the Act. In 1999, Ames' interest penalties totaled \$5595 on total payments of \$404 million. Interest penalties represented 0.0014 percent of total payments made. Interest penalties for 1998 and 1997 were \$10,600 and \$10,300, respectively, representing 0.0023 percent and 0.0019 percent of the total payments made for their respective years.

Ames is working toward processing and paying most of its bills electronically in order to minimize costs and increase efficiency. Approximately 88 percent of all bills were paid electronically in 1999, compared to 84 percent in 1998 and 70 percent in 1997.

In dollar terms, 95 percent of all dollars were paid electronically in 1999, compared to 93 percent in 1998 and 88 percent in 1997. In 1999, 97.1 percent of all discounts offered and determined to be cost-effective were taken. The percentage of discounts taken in 1998 and 1997 were 99.3 and 99.5 percent, respectively.





FINANCIAL STATEMENTS

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STATEMENT OF FINANCIAL POSITION (UNAUDITED)

FOR THE FISCAL YEAR ENDED SEPTEMBER 30, 1999 (IN THOUSANDS)

	AS OF SEPTEMBER 30,	
	1999	1998
ASSETS:		
Intragovernmental Assets:		
Fund Balance with U.S. Treasury (Note 2)	\$ 244,201	\$ 225,862
Accounts Receivable, Net (Note 3)	13,266	8,546
Governmental Assets:		
Accounts Receivable, Net (Note 3)	51	115
Operating Materials & Supplies, (Note 4)	988	950
Property, Plant and Equipment (Note 5)	987,549	928,555
Other Assets (Note 6)	2,360	1,546
Total Assets	\$ 1,248,415	\$ 1,165,574
LIABILITIES:		
Liabilities Covered by Budgetary Resources:		
<i>Intragovernmental Liabilities:</i>		
Accounts Payable	\$ 13,786	\$ 19,881
Other Liabilities (Note 7)	3,525	919
<i>Governmental Liabilities:</i>		
Accounts Payable	116,451	106,724
Other Liabilities (Note 7)	7,425	6,088
Total	\$ 141,187	\$ 133,612
Liabilities Not Covered by Budgetary Resources:		
<i>Governmental Liabilities:</i>		
Other Liabilities (Note 7)	11,179	29,427
Total	11,179	29,427
Total Liabilities	\$ 152,366	\$ 163,039
NET POSITION:		
Balances:		
Unexpended Appropriations	116,327	100,899
Invested Capital	990,897	931,051
Cumulative Results of Operations	4	12
Future Funding Requirements	(11,179)	(29,427)
Total Net Position (Note 8)	1,096,049	1,002,535
Total Liabilities and Net Position	\$ 1,248,415	\$ 1,165,574

The accompanying notes are an integral part of these statements.

STATEMENT OF OPERATIONS & CHANGES IN NET POSITION (UNAUDITED)

FOR THE FISCAL YEAR ENDED SEPTEMBER 30, 1999 (IN THOUSANDS)

	AS OF SEPTEMBER 30,	
	1999	1998
REVENUE AND FINANCING SOURCES:		
Appropriated Capital Used	\$ 598,084	\$ 580,740
Revenue from Sales of Goods and Services:		
To the Public	1,207	596
Intragovernmental	42,128	44,560
Total Revenue and Financing Sources	\$ 641,419	\$ 625,896
EXPENSES:		
Program or Operating Expenses		
Science, Aeronautics, and Technology	\$ 368,095	\$ 387,297
Human Spaceflight	39,785	15,461
Mission Support	185,730	174,523
National Aeronautics Facilities	0	3,456
Research and Development	440	(40)
Spaceflight Control & Data Communications	0	(19)
Research and Program Management	47	(13)
Construction of Facilities	3,995	127
Reimbursable Expenses	43,335	45,156
Total Expenses	\$ 641,427	\$ 625,948
Excess (Shortage) of Revenue and Financing Sources over Total Expenses	\$ (8)	\$ (52)
Nonoperating Changes:		
Unexpended Appropriations	15,428	(28,155)
Invested Capital	59,846	(428,407)
Future Funding Requirements	18,248	(42)
Total Nonoperating Changes	\$ 93,522	\$ (456,604)
Excess (Shortage) of Revenue & Financing Sources over Total Expenses and Nonoperating Changes	93,514	(456,656)
Net Position, Beginning Balance	1,002,535	1,459,191
Net Position, Ending Balance	\$ 1,096,049	\$ 1,002,535

STATEMENT OF NET COST (UNAUDITED)

FOR THE FISCAL YEAR ENDED SEPTEMBER 30, 1999 (IN THOUSANDS)

PROGRAM/OPERATING EXPENSES BY ENTERPRISE:**Human Exploration and Development of Science:**

Space Shuttle	\$	7,552
Space Station		40,556
Life & Microgravity		34,758
U.S./Russian Cooperative		809
Payload Utilization & Operations		965
Total Human Exploration and Development of Space		84,640

Space Science:

Space Science		126,287
Total Space Science		126,287

Earth Science:

Mission to Planet Earth		27,238
Total Earth Science		27,238

Aeronautics and Space Technology:

Aeronautics Research and Technology		308,577
Space Access and Technology		20,323
Commercial Programs		14,857
Total Aeronautics and Space Technology		343,757

Total Enterprise Program Costs	\$	581,922
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COSTS NOT ASSIGNED TO ENTERPRISES:

Mission Communication Services	\$	0
Space Communication Services		0
Academic Programs		0
Other Programs		16,170
Trust Funds		0
Reimbursable Expenses		43,335
Total Costs Not Assigned to Enterprises		59,505
Total Program Expenses	\$	641,427

COSTS NOT ASSIGNED TO PROGRAMS:

Change in Unfunded Expenses	\$	0
Depreciation Expense		0
Funded Increases in Capitalized Property and Inventory, Net		0
Total Costs Not Assigned to Programs		0
Less: Earned Revenue Not Attributable to Programs		0
Deferred Maintenance		0
Net Cost of Operations	\$	641,427

NOTES TO THE FINANCIAL STATEMENTS

NOTE 1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

BASIS OF PRESENTATION

These financial statements have been prepared for FY99 to report the financial position and results of operations for Ames Research Center, pursuant to the requirements of the Chief Financial Officers Act of 1990 and the Government Management Reform Act of 1994. These include the Statement of Financial Position and Statement of Operations and Changes in Net Position. Although the statements have been prepared from the books and records of Ames, in accordance with formats prescribed by the Office of Management and Budget (OMB) Bulletin 94-01, the statements are different from the financial reports used to monitor and control budgetary resources that are prepared from the same books and records. The statements should be read with the realization that they are for a component of a sovereign entity, that liabilities not covered by budgetary resources cannot be liquidated without the enactment of an appropriation, and that the payment of all liabilities other than for contracts can be abrogated by the sovereign entity.

REPORTING ENTITY

Ames is one of nine NASA field centers established to aid NASA in its mission to provide for aeronautical and space activities. The Ames Research Center's accounting system, Commitment, Obligation, Accrual, Disbursement (COAD), is a mechanized system that utilizes the single-source data-entry concept to reduce redundancy of data entry. Multiple transactions are entered into the system simultaneously utilizing a coding structure that allows the system to generate files to be downloaded to the appropriate general ledger accounts. The system provides payroll accounting for approximately 1500 civilian employees and processes approximately 40,000 nonpayroll-related accounting transactions monthly. These are used to update the Financial and

Contractual Status (FACS) report and the General Ledger. These data provide the basic information necessary to meet internal and external financial reporting requirements and provide both funds control and accountability. Ames utilizes fund accounting for control purposes in accordance with Generally Accepted Accounting Principles and Standards established by the General Accounting Office (GAO) and the OMB. A fund is a fiscal and accounting entity with a self-balancing set of accounts recording financial resources together with all related liabilities and fund balances for the purpose of attaining established objectives. Funds are made available for withdrawal from the U.S. Treasury through Congressional appropriation acts.

BASIS OF ACCOUNTING

Transactions are recorded on an accrual accounting basis and a budgetary basis. Under the accrual method, revenue is recognized when earned and expenses are recognized when a liability is incurred, without regard to receipt or payment of cash. Budgetary accounting facilitates compliance with legal constraints and controls over the use of Federal funds.

REVENUE AND OTHER FINANCING SOURCES

Ames receives most of its funding through multiyear appropriations. For Program Year (PY) 1994 and prior, these include three-year and no-year appropriations for Construction of Facilities (C of F), two-year appropriations for Research and Development (R & D) and Spaceflight Control and Data Communications (SF CDC), and a single-year appropriation for Research and Program Management (R & PM). Because of the appropriation restructure, three new appropriations were established in PY 1995. These three new appropriations are Science, Aeronautics, and Technology (SAT); Human Spaceflight (HSF); and Mission Support (MS). In addition to appropriated funds, the Center performs services for other Federal agencies and the public and receives

reimbursable funding. Appropriations are recognized as revenue at the time the related program or administrative expenses are incurred. Other revenue is recognized when earned (i.e., goods have been delivered or services rendered).

FUNDS WITH THE U.S. TREASURY AND CASH

Ames does not have disbursing authority and does not maintain cash in commercial bank accounts. Cash receipts and disbursements are processed by the U.S. Treasury. Funds with the U.S. Treasury include appropriated funds and deposit funds received from the public as advance payments for reimbursable services.

ADVANCES

Advances include travel advances, cash grants, and letters of credit. Ames funds most of its University Contracts and Grants programs through the use of a letter-of-credit system and the automated clearing-house. Quarterly financial reporting of cash transactions is provided by recipients, showing both cash requirements and cash transactions on SF 272s. Detailed monitoring and accountability records are maintained. Monitoring includes audits by the Defense Contract Audit Agency (DCAA) and NASA's Office of Inspector General (OIG).

ACCOUNTS RECEIVABLE

Ames provides accounting for substantial amounts of receivables for services provided to the public and other Government agencies. The largest portion of these is performed for other Federal agencies and includes aeronautical research and technology as well as research operation support. Non-Government customers are required to provide advance payments, which are placed on deposit with the U.S. Treasury until services are performed.

OPERATING MATERIALS AND SUPPLIES

Ames' inventory of Operating Materials and Supplies is composed of the following categories: (a) stores stock, which is material that is repetitively procured, stored, and issued on the basis of recurring demand; and (b) standby stock, which is material held for emergencies. Operating Materials and Supplies are stated at cost and charged, as used, on a moving average basis.

EQUIPMENT

Equipment with a unit cost of \$100,000 or more, and a useful life of two years or more, that will not be consumed in an experiment is capitalized. Equipment with a unit cost of less than \$100,000, or having a useful life of less than two years that will be consumed in an experiment is expensed as current-year cost. Beginning with FY98, NASA implemented SFFAS (Statement of Federal Financial Accounting Standards) Number Six – Accounting for Property, Plant, and Equipment, and SFFAS Number Eight – Supplementary Stewardship Reporting. These standards raised the equipment capitalization threshold from \$5000 to \$100,000. These two standards were not in effect prior to FY98; therefore, there were significant variances between equipment data for FY97, FY98, and FY99. The capitalized cost includes unit cost, transportation charges, installation charges, handling costs, and storage costs. NASA depreciates property, plant, and equipment on a straight-line basis. The use of NASA facilities and equipment is included in charges to Non-Government-reimbursable customers.

CONTRACTOR-HELD PROPERTY

Government-owned, contractor-held property includes real property such as land, building and structures, inventories, plant equipment, space hardware, special tooling, and special test equipment. Contractors, in accordance with Federal

Acquisition Regulations, maintain control and accountability of such property, and Ames is precluded from maintaining duplicate records of these assets. Contractors are directed to report, annually, plant equipment that costs \$100,000 or more, has a useful life of two years or more, and that will not be consumed in an experiment. Beginning with FY98, NASA implemented SFFAS Number Six – Accounting for Property, Plant, and Equipment, and SFFAS Number Eight – Supplementary Stewardship Reporting. These standards raised the equipment capitalization threshold from \$5000 to \$100,000. These two standards were not in effect prior to FY98; therefore, there were significant variances between Contractor-Held Equipment data for FY96, FY97, and FY98. NASA depreciates Contractor-Held Equipment on a straight-line basis. Contractors are also required to submit depreciation and inactive asset data in supplemental forms that accompany NASA Form 1018. There is also required reporting of Special Test Equipment, Special Tooling, and designated Space Hardware. Reporting is accomplished, annually, on NASA Form 1018, Report of Government-Owned, Contractor-Held Property, certified by the contractor's representative and approved by a Government property administrator.

REAL PROPERTY

Real Property includes land, buildings, other structures and facilities, and leasehold improvements when the cost of acquiring and improving the asset is \$100,000 or more. Land is valued at acquisition cost, which, for the most part, may not reflect actual value. Buildings are also valued at cost, including the cost of capital improvements and fixed equipment required for functional use of the facility. Beginning with FY98, NASA implemented SFFAS Number Six – Accounting for Property, Plant, and Equipment, and SFFAS Number Eight – Supplementary Stewardship Reporting. These standards raised the Real Property capitalization threshold from \$5000 to \$100,000. These two standards were not in effect prior to FY98; therefore, there are significant vari-

ances between Real Property data for FY96, FY97, and FY98. The adoption of these standards also required NASA to classify its Real Property into the following categories: General & Federal Mission PP&E, Heritage Assets, and Inactive PP&E. Real Property classified either as Federal Mission PP&E, Inactive PP&E, and/or Heritage Assets will have their values removed from the financial statements. These assets will be reported in physical units. Depreciation for Real Property is monitored and reported by NASA Headquarters. Ames' real property in the hands of contractors is also reported and combined for reporting purposes with Ames-held real property, based on contractor reporting on NASA Form 1018.

LIABILITIES

Accounts payable includes amounts recorded for receipt of goods or services furnished to the Agency, based on receiving reports, billings rendered, cost reports (i.e., NASA Form 533, Contractor Financial Management Report; Standard Form 272, Federal Cash Transactions Report) that provide the estimated contractor and grantee unbilled and unreported cost, and estimated amounts for utilities and payroll.

ANNUAL, SICK, AND OTHER LEAVE

Annual leave is accrued at the beginning of each calendar year and the accrual is reduced as leave is taken. At least once per year, the balance in the accrued annual leave account is adjusted to reflect current pay rates of cumulative annual leave earned but not taken. Sick and other types of leave are expensed as taken.

NOTE 2. FUND BALANCES WITH TREASURY (IN THOUSANDS)

Fund Balances:	<i>Obligated</i>	<i>Unobligated Available</i>	<i>Unobligated Restricted</i>	<i>Fund Balance</i>
Appropriated Funds	\$ 218,795	\$ 19,770	\$ 2,397	\$ 240,961
Suspense/Clearing Accounts				3,240
Total Fund Balance with Treasury				<u>\$ 244,201</u>

NOTE 3. ACCOUNTS RECEIVABLE (IN THOUSANDS)

	<i>Entity Accounts Receivable</i>	<i>Nonentity Accounts Receivable</i>	<i>Net Amount Due</i>
Intragovernmental	\$ 13,266	\$ 0	\$ 13,266
Governmental	\$ 4	\$ 47	\$ 51
Total Accounts Receivable	<u>\$ 13,270</u>	<u>\$ 47</u>	<u>\$ 13,317</u>

NOTE 4. OPERATING MATERIALS AND SUPPLIES, NET (IN THOUSANDS)

	<i>1999</i>	<i>1998</i>	<i>Valuation Method</i>
Stores Stock	\$ 988	\$ 950	Weighted Avg.
Total	<u>\$ 988</u>	<u>\$ 950</u>	

NOTE 5. PROPERTY PLANT AND EQUIPMENT, NET (IN THOUSANDS)

Government Owned/Government Held:	<i>1999</i>	<i>1998</i>
Land	\$ 0	\$ 3,936
Structures, Facilities, & Leasehold Improvements	\$ 708,008	\$ 636,320
Equipment	\$ 251,965	\$ 263,579
Total	<u>\$ 959,973</u>	<u>\$ 903,835</u>
Government Owned/Contractor Held:		
Equipment	\$ 2,361	\$ 337
Space Hardware	\$ 13,518	\$ 13,518
Construction in Progress	\$ 11,697	\$ 10,865
Total	<u>\$ 27,576</u>	<u>\$ 24,720</u>
Total Property, Plant, and Equipment	<u>\$ 987,549</u>	<u>\$ 928,555</u>

NOTE 6. OTHER ASSETS (IN THOUSANDS)

	1999	1998
Contractor-Held Materials	\$ 2,360	\$ 1,546
Total	\$ 2,360	\$ 1,546

NOTE 7. OTHER LIABILITIES (IN THOUSANDS)

Liabilities Covered by Budgetary Resources:

Intragovernmental Liabilities:

Liability for Deposit and Suspense Funds

Total

	Current	Total
Liability for Deposit and Suspense Funds	\$ 3,525	\$ 3,525
Total	\$ 3,525	\$ 3,525

Governmental Liabilities:

Accrued Funded Payroll and Benefits

Total

Accrued Funded Payroll and Benefits	\$ 7,425	\$ 7,425
Total	\$ 7,425	\$ 7,425

Liabilities Not Covered by Budgetary Resources:

Governmental Liabilities:

Accounts Payable for Closed Appropriations

Unfunded Annual Leave

Total

	Current	Non-Current	Total
Accounts Payable for Closed Appropriations	\$ 404	\$ 1,133	\$ 1,537
Unfunded Annual Leave	-	9,642	9,642
Total	\$ 404	\$ 10,775	\$ 11,179

NOTE 8. NET POSITION (IN THOUSANDS)

	Appropriated Funds
Unexpended Appropriations	
Undelivered	\$ 94,160
Unobligated:	
Available	\$ 19,770
Restricted	\$ 2,397
Invested Capital	\$ 990,897
Cumulative Results	\$ 4
Future Funding Requirements	\$ (11,179)
Total	\$ 1,096,049

KEY PERSONNEL



Henry McDonald
Director



William E. Berry
Deputy Director



Robert J. Hansen
*Deputy Director for
Research*



Nancy F. Bingham
*Associate Director for
Systems Management
and Planning*



Robert Rosen
*Associate Director for
Aerospace Programs*



G. Scott Hubbard
*Associate Director for
Astrobiology and Space
Programs*



Charles T. Simonds
*Assistant Director for
Information Technology*



Herman Gardner
*Assistant Director for
Multicultural Programs*



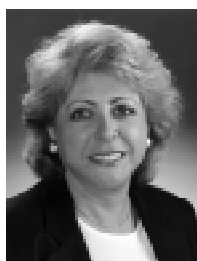
Joseph T. Bielitzki
Chief Veterinary Officer



Stephanie Langhoff
Chief Scientist



Kenneth M. Ford
Chief Technologist



Carolina M. Blake
*Chief, Commercial
Technology Office*



Sally O. Mauldin
*Chief Counsel, Office of
the Chief Counsel*



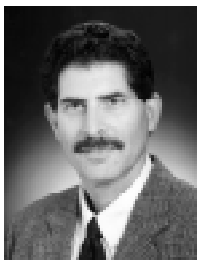
Michael L. Marlaire
*Chief, Development and
Communications Office*



L. S. Fletcher
Director of Aerospace



Clifford C. Imprescia
*Director of Research and
Development Services*



Steve F. Zornetzer
*Director of Information
Sciences and Technology*



David Morrison
*Director of Astrobiology
and Space*



Jana M. Coleman
*Director of Center
Operations*



Lewis S. G. Braxton III
Chief Financial Officer



G. Warren Hall
*Director of Safety,
Environmental, and
Mission Assurance*

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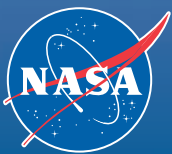
Ames Research Center

<http://www.arc.nasa.gov>

Office of the Chief Financial Officer

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NOTES



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